

REMARKS

The Examiner has rejected claims 1 – 3 and 13 – 15 under 35 USC 102(b) as being anticipated by Oshinsky et al., US 5 616 432.

He has furthermore rejected claims 1 – 5 under 35 USC 102(b) as being anticipated by, or under 35 USC 103(a) as being obvious from, Jap. Patent 03-281710A, Mitsu Mining and Smeltung, and

He has rejected claims 1 – 6 under 35 USC 102(b) as being anticipated by, or under 35 USC 103(a) as being obvious from, Europ. Pat. Appl. EP 0 184 427 A2.

Oshinsky et al. (US 5 616 432) discloses an MgNi based electrochemical hydrogen storage material having a microstructure and also the fabrication of the material into electrodes. The Examiner states that “Oshinsky teaches the mechanical and chemical activation of the surface prior to the formation of the oxide film”. This sounds as if Oshinsky intends to form an oxide film. However, rather the contrary is true. Oshinsky states in column 15, line 25 – 28 that “an improper alkaline surface treatment could actually promote the formation of a thick dense non-porous oxide that would be undesirable”.

Oshinsky consequently teaches the formation of an oxide layer as being undesirable. Certainly, the inventors in Oshinsky et al. will not purposely build up an oxide layer on the surface but try to modify or destroy the oxide layer, which they say is detrimental to the catalytic properties and the hydrogen activity of the base alloy (col. 12, lines 48-54). Co is added to reduce the thickness of the oxide layer (col. 16, lines 15 – 20).

Jap. Pat. 03-281 710 A (Mitsui Mining and Smelting) discloses a method of easily producing rare earth metals at low cost which are capable of storing hydrogen. Starting out with a rare earth metal oxide, pure metals that have a higher affinity to oxygen than the rare earth elements such as Ca, Mg, Al and Li are added. The powder mixture is then subjected to a high temperature treatment to reduce the rare earth metal oxides in a redox reaction to form pure rare earth metals and oxides of Ca, Mg, Al or Li. No reference is made to any catalytic effect of such oxides. In fact it has been determined by the inventors of the present application that the oxides obtained during heat treatment, that is, the oxides of Ca, Mg, Al, or Li do not have any catalytic effects whatsoever.

EP 0 184 427A2 relates to a composition for reversibly absorbing and desorbing hydrogen comprising 0.8 – 20% by weight of one or more oxides of one or more elements selected from La, Nd, Pr, Sm and Eu in ZrV_x ($0.01 \leq x \leq 0.7$). Included is a certain amount of rare earth metal oxides to act as getter sites for collecting gas impurities from the hydrogen gas (page 3, lines 31 – 34; page 4, line 7 – 14).

From page 1, lines 11 – 13, it can be assumed that metal oxides are generally seen as detrimental to absorbing hydrogen, that is, oxide layer need to be removed. It is not mentioned anywhere that metal oxides may act as catalysts. Nevertheless, as the Examiner has pointed out, it is stated on page 2, that the listed materials have a hydrogen equilibrium pressure lower than atmospheric pressure with a relatively high hydrogenation composition at a temperature of less than 300°C and that the materials have a low temperature for initially absorbing hydrogen and a sufficiently fast rate of absorbing and desorbing hydrogen and that they do not require any initial activation treatment. It is stated that these properties are achieved by dispersing specified amounts of one or more rare earth oxides into ZrV having a specified composition and forming a complex. It is not stated that any catalytic action is involved.

In any case, claim 1 has been amended to define that the catalyst includes metal oxides on the basis of Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu and Y and claim 3 which refers to the use of rare earth metal oxides as catalysts has been cancelled.

As amended, claim 1 is clearly novel; None of the references discloses an electrode material which contains any of the metal oxides listed in claim 1 as a catalyst for the hydrogenation or dehydrogenation of the electrode material.

Reconsideration of claim 1 as amended is respectfully requested.

Furthermore, since none of the references discloses an electrode material which contains any of the metal oxides listed in claim 1 as a catalyst for the hydrogenation or dehydrogenation of the electrode material, it can hardly be said credibly that a combination of the cited references would lead to the electrode material as defined in claim 1.

Reconsideration of the rejection of claim 1 under 35 USC 103(a) is therefore also requested.

Claims 2, 4 and 5 all depend on claim 1 and therefore include all the features of claim 1 so that they should be patentable together with claim 1.

The independent claims 6 and 13 also have been amended to define the particular metal oxide catalysts as defined in claim 1. The same arguments therefore apply to these claims.

Claims 8 to 12 define particular method steps which have been found to be advantageous in connection with the method as defined in claim 6. These claims depend on claim 6 and should therefore be patentable together with claim 6.

Furthermore, claims 14 and 15 which depend on claim 13 should be considered to be patentable together with claim 13.

Reconsideration of these claims is respectfully requested. Concerning the Examiner's provisional rejection of the claims of the present application under the judicially created doctrine of obviousness-type double patenting with regard to the claims of US patent 6 752 881 of the same inventors it is noted that the present invention relates to electrodes. US patent 6,752,881 on the other hand relates to hydrogen storage devices. These are quite different fields of interest and applications, which were considered by the inventors to be so far apart that they should, and could not be covered in one patent application. It was therefore decided to file two separate applications. It was not believed that, normally, a person working in the field of hydrogen storage devices (which generally include cryostats) would take the field of electrodes into consideration. Hydrogen storage devices and electrodes are certainly not the same, but are very different as to their uses and applications. Besides, US patent 6 752 881 have the same filing date so that they would normally also expire at the same date. In any case, the filing of a Terminal Disclaimer is not considered to be necessary in the present case and the Examiner is respectfully requested to reconsider his provisional rejection of the application under the judicially created doctrine of obviousness-type double patenting.

Allowance of claims 1, 2, 4 to 6 and 8 to 15 is solicited.

Respectfully submitted,

K. Bach

Klaus J. Bach, Reg. No. 26832